Maritime Domain Awareness: The Key to Maritime Security

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Maritime security is burdened by thousands of years of history and tradition.

We in the Coast Guard are reminded of this truism on a daily basis. One particularly poignant reminder came in October of 2002, a scant thirteen months after the 9/11 attacks. In the middle of a weekday afternoon, a fifty-foot long boat pulled up near the Rickenbacker Causeway in Miami, Florida and offloaded 220 illegal aliens directly into the heart of downtown. Naturally, a news helicopter was overhead and the event was almost instantly broadcast nationwide.[1] The US Coast Guard is supposed to play a leading role in preventing these kinds of incidents, and the Commandant of the Coast Guard at the time, Admiral Thomas Collins, ended up briefing the Secretary of Transportation. After he was told of the incident, the Secretary, in some disbelief, asked Admiral Collins, "How in the world did they get through?" The Admiral's reply was "Sir, with all due respect, how did they get through what?"

This is an amusing story for those of us in the maritime community because we have long known and accepted the openness and vulnerabilities of our many port and coastal areas. It should be an instructive story for us as well, though, as it makes two important points. First, it dramatically reminds us of the vulnerability of these crucial parts of our transportation and economic systems. Our ports are essential transshipment nodes that are responsible for 95 percent of our trade. Many are highly specialized; all have high concentrations of expensive, difficult to replace infrastructure. Most ports are in population centers—and all are economic engines. Yet security has often been seen as an expensive obstacle, rather than an essential contributor, to the long-term, uninterrupted free flow of commerce.

Second, the incident in Miami, and the Secretary of Transportation's reaction, tell us that we maritime professionals fall far short of the expectations of government leaders and the populations they represent. The great majority of our leaders and citizenry are landsmen with no maritime experience at all. They are familiar with air travel, as a large portion of the population has traveled at least once by airplane. They know from movies and television that aircraft, airports, and the skies are monitored by radar operators, and that aircraft off course or in trouble can be quickly identified and assisted. Their experience at airports tells them that the flow of air traffic is orderly, efficient, fairly secure, and much the same from one place to the next. Because few have experience with maritime transportation, they unconsciously assume—and expect—that the kind of orderliness and security they see in aviation also exists at seaports and on the ocean. When they discover to the contrary, they are disappointed, and often wonder why it is that the maritime community has not entered the modern age.

A part of the answer is again that maritime security is burdened by thousands of years of history and tradition. Unlike aviation, which sprang to life as we know it today

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in less than a hundred years and which has a coherent, relatively complete architecture of policies and supporting systems, maritime practices have evolved over centuries. Maritime policies and supporting systems have likewise evolved and have developed ad hoc. Unlike aviation where transparency has been the hallmark of safety and has been improved even more for security purposes, the maritime domain has long been marked by a culture of secrecy that now works against both individual community members and society as a whole.

Policy and Systems Architectures

The world's aviation system has a clearly articulated policy architecture and is supported by a well-developed systems architecture designed to monitor compliance and aid enforcement of the rules regulating flight operations. Maritime transportation, while there are local exceptions around the globe, has generally evolved over the centuries into a hodgepodge of interconnecting, often disparate policies, supported by semi- or completely incompatible sensor and information systems.

In the United States, the maritime domain is made even more complex by highly fragmented, some might say near chaotic, governance. A National Academy of Sciences study determined there were at least eighteen federal agencies that have responsibility for regulating some aspect of US maritime transportation and that there is little to no formal method of coordinating their efforts.[2] Add to these federal agencies a variety of agencies and organizations from the individual states, coastal cities, specially commissioned port authorities, marine exchanges, private facility operators, etc., and you have a truly dizzying picture. It explains the old saying that, "if you have seen one port, you've just seen one port." There are 361 commercial seaports in the United States and all have different combinations of geography, governance, sensors, operating rules, ownership, mix of activities, and so on. It is not a situation that easily lends itself to improvements in safety, security, or the efficient flow of commerce.

While the attacks of September 11 were conducted through the aviation system, the preexisting aviation systems and policy architectures allowed for an exceptionally rapid and coordinated response. Near real-time visibility of the airspace of the United States and effective means of communication throughout the aviation system meant that the threat could rapidly be contained. Over five thousand aircraft were safely landed in less than two hours. Afterward, those same policy and system architectures provided forensics and made it very easy to insert policy changes and systems modifications to prevent further attacks. While one can debate whether or not those changes were the correct ones, once decided upon, they were easily and effectively implemented as a part of overall, coherent policy and systems structures.

We do not have the same advantages in the maritime domain. There is no maritime equivalent of the National Airspace System Plan[3] that details the various parts of the system, how they are supposed to work together, and ensures that each are appropriately considered in governance. Maritime system policies, developed by eighteen different federal agencies, have no uniting structure and, in aggregate, have huge gaps. As one example, over thirteen million recreational craft have virtually unfettered access to the nation's commercial and military harbors. While the individual states require that these boats be registered, many have no or lax titling practices, making boat

registration much easier to obtain legitimately or fraudulently. And, unlike motor vehicle registrations, vessel data is not easily exchangeable and accessible by enforcement officials. An enforcement officer in Florida, for example, has a very difficult time, if it can be done at all verifying information for a vessel that appears to be registered in Michigan. Further, and most importantly, few boaters are currently required to know how to safely operate their vessel and understand maritime rules and regulations. Most states do not even require that a boat operator carry personal identification. Imagine the impact on highway safety and law enforcement if drivers were not only untrained and unlicensed, but not even required to carry photo identification.

Compounding the lack of a complete and coherent maritime policy structure is a lack of systems to enforce those policies we do have. In 2003, four Cuban Coast Guard members decided they no longer wanted to work in Castro's Cuba. One night they drove their small patrol boat north until, at about three o'clock in the morning, they found the Hyatt Hotel marina in Key West, Florida. They walked around Key West for two hours until they located a patrolling police officer and surrendered.[4] One can imagine them handing over their side arms and explaining that their AK-47s were still in the boat. Despite comprehensive laws that establish strict requirements for international maritime arrivals, our lack of adequate maritime surveillance results in an average of fourteen successful, illegal, malicious incursions into the United States each and every week. We can only hope that the damage is limited to landing illegal migrants, tons of narcotics, and the occasional well-armed Cuban Coast Guardsman.

A Culture of Secrecy

Another part of the burden of maritime history and tradition is a culture of secrecy. Dealers in commodities don't want competitors to know the sources and destinations of their cargos. Fishermen don't want others to fish their favorite spots. Ownership of commercial vessels is often concealed through a network of contracts and paper corporations. On the vast and largely ungoverned and un-policed global commons that are the world's oceans, being difficult to find has been key to protection from pirates, the navies of hostile nations, and others that would do a vessel harm.

This tradition of secrecy, along with the nature of the sea and ships, has led to maritime transportation being the preferred vector for some of the world's most infamous and evil cargos. Slaves, contraband, narcotics, conventional weapons to start a new war, or a weapon of mass destruction to inflict terror, all these and more can be transported in greater quantities, and often with greater secrecy, by sea than by any other mode. Maritime commerce brings near limitless good to the world, but its culture of secrecy has allowed it to bring significant evil as well.

The international community has always struggled to maximize the good and minimize the evil brought by maritime transportation. We want to take advantage of the sea's bounty to feed our children, but don't want to destroy the fishing grounds and starve our grandchildren. We want to ensure the free flow of commerce, but don't want illegal substances and people smuggled ashore. We want freedom of navigation, but are concerned that a vessel carrying thousands of tons of explosive cargo can sail mere miles off our coast, en route from one foreign port to another, with no obligation to report its position or course, or obey our directions. We are concerned that some day such a vessel

will be transiting off one of our ports or a defense facility or a large city when it suddenly turns toward shore—and disaster will strike.

We understand that in an information age security lies not in secrecy, but in transparency. And we are becoming convinced that it is time to begin shedding the burden of thousands of years of maritime history and tradition.

So how shall this be done? Improving governance with a more coherent and systematic approach to maritime regimes (policies, rules, regulations, statutes) is certainly required. We must also ensure that sufficient patrol and enforcement assets are deployed to deter and respond to violations of those policies. First and foremost though, we must understand the maritime domain and what is going on within it, so that we can formulate good policy, effectively deploy assets, and ensure the uninterrupted free flow of commerce.

Maritime Domain Awareness – See, Understand, Share

Our goal must be to achieve "An effective understanding of anything in the maritime environment that can effect the safety, security, economy, or environment of the United States," the definition of "maritime domain awareness" in the National Strategy for Maritime Security.[5] Achieving awareness will require that maritime activities and actors become more transparent, that what is seen is properly understood, and that this visibility and understanding be shared as widely as possible among members of the maritime community.

See.

We must overcome the traditional culture of secrecy and make all activity and actors more transparent. Evil can dwell only in dark and hidden places. Transparency leads to self-correcting behavior by shining a light that exposes bad actors and reinforces the ethic of good ones. It levels the playing field by revealing the cheat and removing his advantage. It improves safety and commerce by better informing users of hazards, conditions and routes. And it helps us focus scarce enforcement resources in the most important areas.

Understand.

Watching the flow of maritime activities and actors is of little use unless what is being seen can be understood. Decision makers must be able to differentiate a normal and innocent scene from one containing anomalies that deserve further investigation. When available, intelligence, analysis and pattern recognition must be integrated into a context of broad situational awareness to understand motives and intent. The goal is to deter and prevent all threats and all hazards. Without understanding, the best surveillance system in the world will only be able to document adverse events as they unfold.

Share.

If we are to be successful in our maritime safety, security, and stewardship efforts, we will need to harness the abilities, authorities, time and efforts of all stakeholders. "Unity of command" among various levels of our federal, state and local governments, agencies of foreign governments, industry partners, etc. is unachievable and undesirable. Rather,

we must foster "unity of effort" in pursuit of our mutual goals and interests through pro-active, aggressive information exchange. Sharing data, analysis, operating pictures and the like as broadly as possible (given appropriate security and permissions) will provide multiple benefits and help with at least two significant problems:

- We don't know what we know. Information needed to make critical decisions often exists, but is not available and correlated by those who might use it. Data that showed multiple men of foreign origin traveling with no luggage had purchased airline tickets shortly before flight time on four different airlines existed on the morning of September 11, 2001. Had this data been available and shared widely in an aviation safety and security community that understood the potential threat, the world today might be a far different place.
- The challenge of complexity. The pursuit of maritime safety, security and stewardship involves widely diverse players with far different sets of authorities, responsibilities and capabilities—and these players operate in unique and varied geographic and maritime locations. Shared awareness empowers each player and fosters unity of effort in dozens of ways from better informing individual missions and avoiding "blue on blue" conflict, to drawing on the unconscious knowledge of local experts. Done properly, it enables each member of the maritime community to use shared data and knowledge to create a unique picture in support of their own needs and missions. This enables each to bring the full force of their unique authorities, experience and expertise to the overall effort.

The Way Ahead

In the abstract, Maritime Domain Awareness (MDA) is a state of being, a goal that will never be completely obtained as we strive for ever greater understanding. More concretely, it is something that mariners have been obtaining, to a degree, since the first dugout canoe was launched and people felt the pull of the current and the pressure of the wind.

As now envisioned, Maritime Domain Awareness is a process that collects, fuses, and analyzes data about activities in, and the conditions of, the maritime environment and then disseminates the data gathered and analysis results to decision makers. Put another way, it's the ability to gather the information to detect what it is that's the threat, fuse the information to truly know that it is a threat, analyze it so that the necessary corrective action can be determined, and then be able to move that information to a command and control mode (the decision maker) to order the necessary action to be taken. It is a process that will be heavily dependent on technology, some of which currently exists, some of which will require development. The "observables" on which information is collected includes the characteristics of the vessel and its history; information on the passengers, crew and cargo, infrastructure, sea lanes, threats and weather. The collection portion of the process will involve a wide variety of sources: sensors, both short and long range; open source; private sector; law enforcement; intelligence agencies; and, of course, our international partners. Our surveillance capabilities must be persistent and pervasive. Some of the sensor technology to meet this requirement already exist, e.g., radars, cameras and space-based imaging systems, however, nearly all existing systems

require upgrades. Other technologies, including high-altitude, long-endurance unmanned air vehicles; remotely piloted, unmanned surface and subsurface vessels; and aerostats and buoys equipped with a variety of sensors are possibilities for the future system.

The next step is the MDA process is to fuse and analyze data gathered. Unless that can be accomplished in a timeframe that permits effective action to be taken against identified threats, the utility of the data will be limited. Processing the massive quantities of data in a timely manner to create actionable information presents an enormous challenge. Advanced, automated data-fusion technologies will be critical to the task and these do not exist today except as advanced research and development projects.

Because MDA can only be achieved through a partnership of many government agencies, the dissemination of information between agencies and other stakeholders is essential. Today the sharing of information among agencies is dependent on existing networks and communication processes. Unfortunately most of those systems were designed for intra-agency not inter-agency dissemination of information. These communication difficulties are further compounded when nonfederal organizations are considered. While progress has been made, much needs to be done to develop networked information sharing using Internet-based technologies that will be the key to ensuring that the necessary information is presented to operational commanders and other decision makers in a manner that enables accurate, dynamic and confident decisions and responses to maritime threats.

While much remains to be done to create the MDA process of the future, our awareness of activities in the maritime domain is better today than at any point in history. Much of that progress has been made in the five years since 9/11. We now require major vessels in international trade to carry Automatic Identification System transmitters so that we can track their movements. US Customs and Border Protection's National Targeting Center has made huge progress in understanding the supply chain and tracking cargoes. The International Maritime Organization has agreed to a fundamental change in the world's view of information to which a coastal State is entitled concerning ships on international voyages. For the first time, coastal States have the right to know about ships that are just passing by up to 1,000 nautical miles offshore.[6] Yet our understanding of the sea and activities therein remains highly fragmented and contains huge gaps. To use an aviation metaphor from 9/11, in the maritime environment there are still a lot of un-reinforced cockpit doors. We have a duty to do better.

To do substantially better will require unity of effort across the entire maritime community. The National Plan to Achieve Maritime Domain Awareness,[7] approved by the White House in October of 2005, envisioned such an effort and provided the first few tentative steps forward on what will be a continuing journey. In the two years since its approval, the interagency process has developed an MDA Concept of Operations that establishes both a maritime situational awareness enterprise, and a national MDA governance structure. The new "Director, Global Maritime Situational Awareness" (GMSA) as an interagency position hosted by the Coast Guard. Along with the Director, Global Maritime Intelligence Integration (a pre-existing position within the Office of the Director of National Intelligence), the GMSA Director will co-chair an inter-department MDA Stakeholder Board that has responsibility for identifying needs, advocating for solutions, and ensuring coordination between departments and agencies.

Complementing the progress in governance has been the rapid development of MDA technology and data sharing projects that are blossoming almost faster than they can be harvested. One especially noteworthy effort is the MDA Data Sharing Community of Interest. Jointly sponsored by the Coast Guard and US Navy, with technical advice from the Defense Department Chief Information Officer's office, the project is demonstrating the ease of data sharing in a publish-and-subscribe, network-centric environment that can accommodate members as diverse as local harbor police and national intelligence analysts. Even more importantly, it is proving once again that technology is the easy part of the equation compared to addressing political, process and people issues.

Conclusion

Maritime Domain Awareness is the key to Maritime Security. Our current awareness capabilities fall far short of where we could be—and should be—given available technologies and a reasonable willingness to work together. Our national security depends upon continued progress on a journey that has only begun. Moreover, the public expects we should already be far ahead of where we are. We should make best speed to meet, and then exceed, those expectations.

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[1] For a report of the incident as it was occurring, see CNN.com, Haitian Refugees Jump Ship and Walk to Shore, http://transcripts.cnn.com/TRANSCRIPTS/0210/29/bn.02.html (last visited, Feb. 28, 2007).

[2] Transportation Research Board of the National Academy of Sciences, The Marine Transportation System and the Federal Role: Measuring Performance, Targeting Improvement 83 (2004).

[3] The National Airspace System Plan was developed by the Federal Aviation Administration. First published in 1981, and updated several times since then, it is a comprehensive plan to modernize and improve air traffic control and airway facilities services.

[4] *See* NBC6.net, Four Cuban Coast Guardsman Defect in Key West, Feb. 7, 2003, http://www.nbc6.net/news/1963227/detail.html.

[5] The White House, National Strategy for Maritime Security 27 (Sept. 2005), *available at* http://www.whitehouse.gov/homeland/4844-nsms.pdf.

[6] *See* International Maritime Organization, Maritime Safety Committee, Long Range Identification and Tracking, http://www.imo.org/Safety/mainframe.asp?topic_id=905 (last visited Mar. 8, 2007).

[7] The White House, National Plan to Achieve Maritime Domain Awareness (Oct. 2005), *available at* http://www.uscg.mil/hq/cg-5/docs/MDA%20Plan%20Oct05-3.pdf.